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Military

Lance Line Construction

C. DeF. Chandler.

1882

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Military Lance Line Construction

CHANDLER

Military Lance Line Construction.

For

Semi-permanent Field Telegraph and Telephone Lines.

By

CHAS. De F. CHANDLER,

First Lieutenant and Signal Officer First Battalion Engineers, O. N. G., Late Signal Corps, U. S. V.

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PREFACE.

This manual for military lance line construction is prepared because of the lack of any modern work on this subject. The author, while serving as a signal officer of volunteers in the Army of the United States, tried this plan of organization for lance line squads at Camps Alger, Meade, and Mackenzie, and through Cuban jungle, and the remarks are called for from experiences found at these places. The variable numbers and positions of the men in a squad were also found necessary to meet different conditions. A test of this method was made at Camp Alger, Va., during the Spanish-American War, when six signal corps men constructed a half-mile of lance line, made ground connections, attached telephones, and communicated in twenty-eight minutes.

C. DeF. C.

Cleveland, O., May 17, 1900.

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MILITARY LANCE LINE CONSTRUCTION.

A squad for lance line construction should consist of one sergeant, one rod-man, two reel-men, one lance truck assistant, two bar-men and two line-men, all being under command of a commissioned officer. Their duties are as follows:

THE SERGEANT.

The sergeant should be one who is experienced in lance construction. He lays out the course which the line is to take and is practically the surveyor. His judgment must decide the most advantageous route and the proper angle when there is a change of direction. If the line is to be constructed hurriedly, there should be as few changes in direction and as little clearing done as possible. The sergeant stands at the stake at the angle and carefully directs each new course. He sends the rod-man in the direction ordered and lines him in as he advances, planting a stake at every fifty paces.

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THE ROD-MAN.

The rod-man carries a light crow-bar, or in sandy soil, a sharp stick about five feet long, a haversack of small wooden stakes, or marking pins made of iron wire painted white. The bar or stick is used the same as a surveyor's rod. When he has advanced fifty paces he turns and faces the sergeant, who lines him in by motions of his hand on either side. When the alignment is correct, he drops his bar straight down, making a small hole, in which he places a marking pin. Then counting from that place, advance another fifty paces and repeat the operation. In case fifty paces would bring the pole in the middle of a roadway, it should be placed on the side of the road making less than fifty paces.

THE REEL-MEN.

Two men should watch the reel, when unreeling from a wagon, and carry or "buck" (Fig. 5) the reel when going through places impassable for a wagon. The wire must follow the line of marking stakes as rapidly as it can be laid. In case the number of men for the work must be reduced, one man can attend the

reel instead of two, but in "bucking," he must be assisted by the lance truck assistant. When there is much of the "bucking" to be done, the extra man at the reel cannot be dispensed with. The reel must not be allowed to spin and unwind an excess of wire, or it will easily become tangled and frequently catch in the coil while unwinding. The reel-man must be on the alert and have the driver stop the instant a tangle or catch occurs, to prevent pulling the reel and attendants off the wagon.

THE LANCE TRUCK ASSISTANT.

The lance truck assistant accompanies the truck, and deposits a pole with insulator attached at each marking stake. Every fifth insulator should be a tie or ram's horn insulator (Fig. 1). If the lances are carried in the same wagon as the reel, he accompanies that wagon with the same duties. Care must be used in throwing down the poles so as not to break or damage the insulators.

THE BAR-MEN.

The bar-men, with crow-bars, make a hole at each marking stake, put the wire on the insulators, plant the

pole and tamp the ground firmly around it. In sandy soil, it is necessary to plant the pole at least twenty inches deep. In hard ground fifteen inches is sufficient. The two bar-men take alternate poles and when a tie or ram's horn insulator is reached, both men work on that pole together, one pulling the wire taut, the other attaching it to the insulator. When wood or wire marking pins are used, the bar-men preserve them and send them forward to the rod-man at every opportunity. Some soil may be found which is rocky or baked hard by the sun. Here the bar-men must be reinforced in numbers sufficient to keep this section of the construction party from delaying those following.

THE LINE-MEN.

The line-men will carry a small coil of wire, an axe, porcelain insulators, pliers and climbers. They follow in rear of the bar-men and put on the guy wire to brace the pole at each change of direction. As there is great danger of the rubber insulators breaking, a small porcelain insulator should be wired to the top of the pole (Fig. 3) in place of the rubber insulator where the line changes direction at any angle greater than 30° (Fig. 7). Much time can be saved and it is to their advant-

age for the line-men to keep up with the bar-men if possible. The porcelain insulator is wired to the pole so that the line wire will run in the groove of the insulator. In crossing a road where there is a lead of permanent poles, a porcelain or glass insulator should be put on the pole a few feet higher than the tops of the lance poles. This will serve to keep the wire from falling across the road in case of accident to the line and above the tops of any exceptionally high vehicles. Whenever a tree or pole is in the line of the proper pull-off at a change of direction, the pull-off wire should be secured at the height of the top of the lance pole. This prevents any tendency of the pole to bend, also relieves the danger of any breakage of the guy wire through accidents or stakes pulling out. A small bush is better to guy the pull-off to than a stake, as it is not in danger of pulling out in wet weather. Where the line has few changes of direction, and little clearing of branches from the wire, one line-man is sufficient.

TAKING UP A LANCE LINE.

Taking up a lance line requires but four men with duties as follows.

A line-man precedes the reel wagon and pulls up each pole, takes the wire off the insulator, leaving both on the ground for the wagon-men following to pick up. All guy wires must be cut from the poles.

A truck assistant accompanies the wagon and puts the dismantled poles and insulators thereon,—*first* unscrewing the insulator to prevent its being broken.

Two men reel up the wire as the wagon advances or "buck" the reel in places which are impassable for the wagon.

SUGGESTIONS.

It will often be found necessary to increase the force of line-men with several additional men to clear away branches, brush and vines from the wire. Machetes are the best tool for this work and should be obtained if possible.

Much time may be lost in cutting down trees or in climbing to cut away branches. A light pole, with a crotch at the end and long enough to reach above the

wire, can be used to good advantage. Put the interfering branches in the crotch and twist the pole around until the branches break off.

The sergeant should take care to run the line near a permanent pole if crossing a road with a lead, so the wire can be secured to it.

The kind of marking stakes used will depend entirely on the nature of the ground over which the line is to be passed. In tall grass, wire marking pins will not do, and sticks about three feet long will be required.

In crossing a road which is on a ridge with the slope down on each side, a pole should be placed on each side of the road with tie insulators on each to prevent the line from sagging too low in the road, also to prevent the wire from falling in case of accident to the line on either side.

In crossing a much-traveled road, roads in sandy locality or roads used by unusually high vehicles, the wire should be raised higher by binding two lances together with wire to make the pole about eight feet longer (Fig. 4).

Where there is plenty of construction material on hand, a line can be more economically and rapidly constructed and easier taken up if it runs along the side of

a wagon trail or road, than to "buck" the reel across country, carry the lances and cut away branches in order to shorten the line.

In clear country the rod-man can continue marking the line in the same direction without assistance from the sergeant by lining himself in with two marking pins in the rear.

It is difficult to construct a line in a heavy fog or smoke unless the rod-man can see the last two poles erected and line in on them. If not, large white signal flags may be advantageously used.

The sections of a construction party should work as near together as possible, as it often occurs that the line-men or rod-men will run out of material, and if far apart, much delay is occasioned in bringing it up.

The officer in charge of the squad should arrange the number of men for each section of the construction party, according to the conditions of the country, and change whenever necessary. He should visit each section frequently, and when any are behind, have the delinquent section reinforced until it can keep up. For example: If the bar-men are slow and the line-men wait for them, one of the line-men, or a man from the reel, should be detailed at once to help out the de-

linquents. The officer should also see that the line-men are supplied with insulators and wire before the supply is exhausted. This may be done by having some dropped off the line wagon with the poles at convenient intervals. The officer should reconnoiter in advance and advise the sergeant of the best route to take when the course has not been previously examined and laid out.

When the number of signal-men is insufficient, other detailed soldiers may, with a little instruction, be used for clearing branches from the wire, as the extra man at the reel, or as additional bar-men.

In a camp where there is much lance construction, a mounted inspector should patrol the lines at least once a day. He should respond immediately when notified by the central exchange of trouble on any line. His equipment should be a line-man's outfit and a short crow-bar which can be carried in a carbine boot.

It is very often the case that the four-mule army escort wagon is used as a lance truck as well as for carrying the reel, and it will be found convenient in operating the reel to place it across the wagon box (Fig. 6). This gives plenty of room for the reel-men to work and affords a place in the bottom of the wagon for carry-

ing about one hundred lances. A hand reel fastened across the wagon box has the advantage of being easily taken off to "buck" through places impassable for a wagon; however, this can not be done with many styles of signal corps wire wagons.

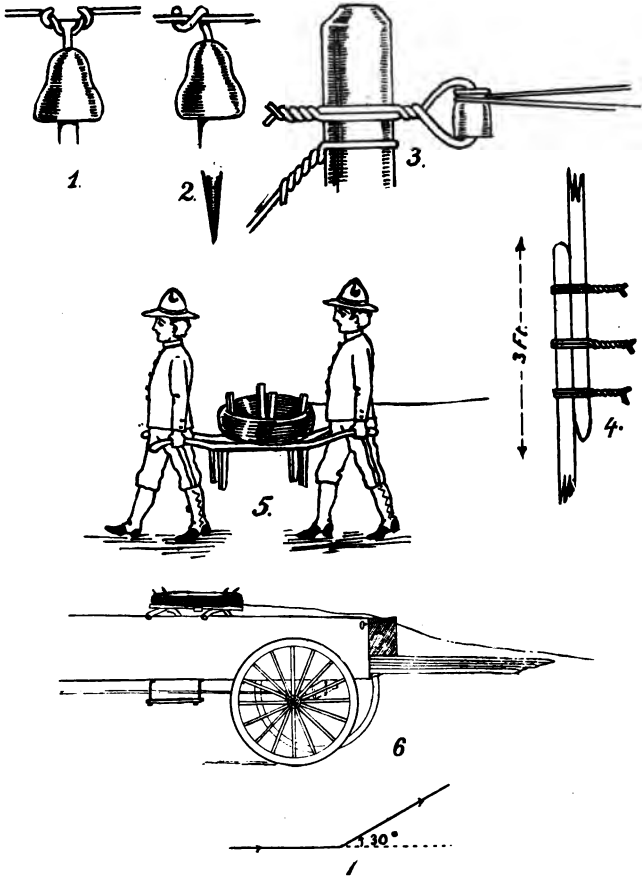
Sandy soil presents many difficulties to telephone line construction, not alone from the unstability of the lances, but the difficulty of making good ground returns. It requires a metallic circuit where the soil is sandy, to give good service. The return wire should parallel the main line wire, and where a common return is used for several lines, such lines should parallel the return wire as far as practicable to prevent induction and "cross talk."

Number 14 galvanized iron wire is the most suitable for lance line construction. The same size of copper may be used, but it will not stand the hard service and twists, like the iron wire. Wire as large as No. 9 may be used, but is too large to pass freely through "pig tail" insulators, and in pulling taut, the poles bend out of shape and the hard rubber insulators frequently break.

The methods of attaching telephone and telegraph instruments and inside wiring at central stations is not

in the province of this manual. Lightning-arrestors should never be omitted, as lightning might unexpectedly disable a system beyond repair with the materials at hand.

TELEPHONE EXCHANGE, CAMP COLUMBIA, HAVANA, CUBA.



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